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APPLICATION FOR UNITED STATES LETTERS PATENT
FOR
METHOD AND APPARATUS FOR CONVERTING GONDOLA SHELF
TO GRAVITY FEED SHELF

Inventors: Edward I. Knorr, Jr.
Paul C. Ziegelbauer
Joseph Coretti, Jr.

METHOD AND APPARATUS FOR CONVERTING GONDOLA SHELF TO GRAVITY FEED SHELF

REFERENCE TO RELATED APPLICATIONS

(0001) This disclosure claims priority to, and is entitled to the benefit of the filing date of, United States Provisional Application No. 60/446,922, filed February 12, 2003, for all subject matter commonly disclosed therein.

BACKGROUND

FIELD OF THE INVENTION

(0002) This disclosure relates generally to gravity feed shelving and, more specifically, to an assembly and method for converting conventional flat gondola-type, cantilevered shelves into gravity feed shelving having inclined rollers to facilitate progression of un-sold merchandise to the front of the shelf.

DESCRIPTION OF THE PRIOR ART

(0003) Shelving space, and especially clearly visible front edge shelving space, in the aisles of grocery stores, drug stores, warehouse stores and club stores is at a premium. Retailers and wholesalers alike often utilize cantilevered shelves, generally known as gondola shelving, to display food and beverage items, as well as other goods, for purchase.

(0004) In order to maximize inventory turnaround, as well as to keep merchandise displayed in a neat and orderly fashion, gravity feed shelving has become increasingly popular among wholesalers and retailers. Gravity feed shelving has been particularly useful in refrigerated aisles and coolers, where the freshness of items is of prime concern. In most instances, refrigerated gravity feed shelving is stocked from the rear of the shelving unit, for first-in-first-out display and retrieval by the customer, at the front of the shelving unit. Such gravity feed shelving advantageously helps increase inventory turnover and reduce spoilage by deterring customers from sifting through product on a flat shelf in order to locate a particular item with a later expiration date than items displayed at the front of the shelf. For

example, gallon containers of milk are often displayed for sale on gravity feed merchandising systems featuring inclined shelves each consisting of a plurality of roller track members extending between front and rear rails that, together with side rails, and typically, lower cross rails for additional support, define a shelf frame.

(0005) Although gravity feed shelving, and in particular, roller track shelving, is also useful for non-refrigerated items, in view of the prevalence of low-cost gondola shelving, it has been cost prohibitive for most retailers and wholesalers to introduce gravity feed shelving in other areas of their stores, with few exceptions, despite the benefits to be gained by gravity feed shelving.

(0006) One area of stores in which gravity feed roller shelving would be particularly useful is in the beverage aisle of supermarkets, wherein multi-packs, i.e. cartons, of canned and bottled beverages are displayed for sale. These multi-packs may take the form of cardboard boxes, and are available in quantities such as 12-packs, 18-packs, or 24-packs, with the number designating the number of beverage cans in the box. Given the weight of the boxes, when displayed for sale on existing gondola or half-gondola (or so-called "wall") shelving, customers are generally disinclined to reach to the rear of a shelf after the boxes displayed at the front of the shelf have been removed for purchase by previous customers. Stockkeeping personnel are therefore required to make frequent trips through the beverage aisle in order to pull unsold multi-packs from the rear of the shelf to the front of the gondola shelf, thereby increasing labor costs.

(0007) Of particular concern to beverage makers, bottlers, and distributors, if the unsold multi-packs of a particular brand of beverage are all at the rear of a given gondola shelf, and unsold multi-packs of a competing brand are displayed at the front of another gondola shelf located nearby, the consumer's brand loyalty to the first beverage may even be diminished, and the consumer may select the competing, more prominently-displayed multi-

pack. Thus, there is a need for a reliable way to keep all beverage cartons ready for sale towards the front of a given shelf of a gondola shelving unit. It would therefore be desirable for a gondola shelf to be easily and inexpensively converted to a gravity feed shelf, without the need to entirely replace the gondola shelf.

(0008) Furthermore, known gravity feed roller track shelving typically requires providing front and rear rails on a shelf frame to which the front and rear ends of several individual track members are secured, the track members each having rollers rotatably mounted thereon. In order to achieve improved rigidity to a shelf platform so that the shelf may support a greater load, e.g. of stacked 24-can cases of soft drink product, it would be desirable if the roller track members, or even the rollers, were mounted directly to the flat surface of a metal sheet forming the shelf, i.e. as opposed to being secured only along the front and rear rails.

(0009) There are also problems of the beverage cases rocking from front-to-back and "shuddering," as it were, as they travel down a roller bearing surface of a conventional gravity feed shelving system. This is caused by the horizontal alignment, i.e. side-to-side orientation, of rollers along the shelf leaving gaps into which the leading edge of a given case has a tendency to fall until it suddenly encounters the next row of aligned rollers. When the leading edge of the case contacts the next-lower horizontally aligned row of rollers, that leading edge of the case jerks back upward. The shuddering, or up-and-down movement of the case, even amplifies as the case gains speed due to gravitational forces, i.e. as the case moves from the higher rear to the lower front of the inclined shelf. This can cause, in extreme cases, the top most case in a stack of multiple cases to fall off the stack, undesirably disorganizing inventory. It would be desirable if this tendency of cases to shudder as they move down an inclined gravity-feed shelf could be reduced or eliminated.

(0010) It is recognized that many beverage cases are constructed of relatively flimsy, frequently recycled, and relatively weaker, paperboard or cardboard. The printing on the cases also creates a slick sliding surface, which is considered desirable inasmuch as the cases are frequently stored outdoors or in damp warehouse facilities near open loading dock-bay doors where they can be exposed to the elements; the slick surface preventing moisture from causing disintegration of the packaging. However, this slick surface is a double-edged sword in that it also creates a problem of speed when the cases move down an inclined roller-bearing, gravity-feed shelf. The slickness leads to a lower friction coefficient between the rollers and the bottoms of the cases, meaning the cases move faster along the inclined shelf and more strength is required at the front end in order to prevent the cases, which stop abruptly as they reach the lower front end of their travel, from falling over the front of the shelf. This problem is further complicated by the stacking of cases, sometimes as many as five high, because a given case of beverage cans, e.g. at the top of such a stack, can be difficult to stop as the stack slides from the rear to the front of the roller-bearing gravity-feed shelf.

(0011) The manner in which these and other problems are overcome, and the desired advantages are achieved, by the present invention will be demonstrated through the various embodiments disclosed in the following Detailed Description of the Preferred Embodiment, and with reference to the drawings.

DESCRIPTION OF THE DRAWINGS

(0012) FIG. 1 is a perspective view showing a conventional gondola shelving unit;

(0013) FIG. 2 is a perspective view, partially broken away, of a conventional bottom shelf of a conventional gondola shelving unit, converted to a gravity feed shelf utilizing a pair of apparatus of a first embodiment of the present invention;

(0014) FIG. 3 is a cross-sectional view, partially broken away, taken along lines 3-3 of FIG. 4, with part of the base of the bottom shelf removed for clarity;

(0015) FIG. 4 is an enlarged perspective view, partially broken away, showing a gondola shelf converted to a gravity feed shelf using an apparatus of a first embodiment of the present invention;

(0016) FIG. 5 is a top perspective view showing a step in the manufacture of an apparatus of the first embodiment of the present invention;

(0017) FIG. 6 is a perspective view showing the inwardly-directed legs of roller track members about to be received in the inward wing channels formed in the manner shown in FIG. 5;

(0018) FIG. 7 is an end view, broken away, showing a pair of inward wing channels formed in the manner shown in FIGS. 5 and 6;

(0019) FIG. 8 is a perspective view showing a plurality of roller track members secured to inward wing channels formed in the manner shown in FIGS. 5 and 6;

(0020) FIG. 9 is a top plan view showing a step in the manufacture of an apparatus of the second embodiment of the present invention;

(0021) FIG. 10 is a top perspective view showing a step subsequent to the step shown in FIG. 9 in the manufacture of an apparatus of the second embodiment of the present invention;

(0022) FIG. 11 is a top plan view showing a step in the manufacture of an apparatus of a variation of the embodiment shown in FIGS. 9 and 10;

(0023) FIG. 12 is a top perspective view showing a step subsequent to the step shown in FIG. 11 in the manufacture of an apparatus of a variation of the embodiment shown in FIGS. 9 and 10;

(0024) FIG. 13 is a perspective view of the apparatus of the second embodiment of the present invention;

(0025) FIG. 14 is a front perspective view, broken away, showing a manner of extending a front end stop of the apparatus of the present invention in order to impede products which are stacked on a lowermost product from falling over the front of the converted gondola shelf;

(0026) FIG. 15 is a top perspective view, broken away, of a gondola shelving unit having an apparatus of the present invention thereon, and showing a manner of extending the front end stop alternate to that shown in FIG. 14;

(0027) FIG. 16 is a left side view showing how the extensions of the front end stop shown in FIGS. 14 or 15 prevent products stacked on a lowermost product from falling over the front of the converted gondola shelf;

(0028) FIG. 17 is a perspective view, partially broken away, of an apparatus in accordance with the present invention, applied to a flat gondola shelf, and including a front end retainer wire for securely and releasably retaining stacked merchandise; and

(0029) FIG. 18 is a cross-sectional view, taken along lines 18-18 of FIG. 17.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

(0030) With reference to the drawing figures, a conventional gondola shelving unit 10 is shown having bottom shelves 12, and cantilevered shelves 14. The gondola shelving unit 10 includes a main wall 16 and slotted vertical rails 18, 20. Hooks 22, 24 extend rearwardly from sidewalls 26, 28 of each of the cantilevered gondola shelves 14 and are securely received in corresponding slots 30 in the slotted vertical rails 18, 20 at selected heights in order to mount the cantilevered gondola shelves 14 to the slotted vertical rails 18, 20, as is well known in the art.

(0031) In order to increase inventory turnover, maintain a neat and orderly appearance of merchandise, and decrease labor involved in maintaining the appearance of merchandise, the present invention allows the conversion of conventional gondola shelves, including bottom shelves 12 and cantilevered gondola shelves 14, into a gravity feed shelf, examples of which are shown at reference numbers 32, 132. In a first embodiment, shown in FIGS. 2-8, the apparatus for converting the gondola shelf 12, 14 into a gravity feed shelf 32 takes the form of an inclined shelf sheet 34, preferably formed of 20 gauge steel sheet stock, and having a plurality of roller track members 36 secured directly thereto.

(0032) The incline of the inclined shelf sheet 34 is achieved, for example, by means of a downwardly-extending support leg 38 that extends from the rear of the inclined shelf sheet 34, and a stop member 40. In this embodiment, as shown in FIG. 3, the stop member 40 takes the form of an elongated L-shaped bracket 42, also preferably formed of steel. The elongated L-shaped bracket 42 has a vertical component 41 and a horizontal component 43. The L-shaped bracket 42 is secured to the downwardly-extending support leg 38, for example by spot-welding the vertical component 41 of the elongated L-shaped bracket 42 thereto.

(0033) The elongated L-shaped bracket 42 is spaced above a lowermost end 44 of the downwardly-extending support leg 38, with the exposed portion of the downwardly-extending support leg 38 beneath the elongated L-shaped bracket 42 defining a catch portion 46. This is possible because of an elongated gap 48, which is the result of the rear of the shelf 12 being spaced from the main wall 16 of conventional gondola shelving units by a distance denoted by the letter "d" in FIG. 3. A similar gap exists on gondola shelving units between the rear of each cantilevered shelf 14 and the main wall 16.

(0034) When the gravity feed shelf 32 is placed on the gondola shelf 12 and pushed to the rear of the gondola shelf 12, the catch portion 46 is received in the available gap 48 as is typically present between the gondola shelf 12 and the main wall 16 of the gondola shelving

unit 10. The stop member 40 rests on the back end 50 of the gondola shelf 12, thereby raising a rear end 52 of the gravity feed shelf 32 up off the back end 50 of the gondola shelf 12 by a distance generally denoted by letter "D" in FIG. 3.

(0035) By way of example, the downwardly-extending support leg 38 has a height of approximately 2-½ inches, and the horizontal component 43 of the L-shaped bracket 42 is spaced approximately ½ inch above the lowermost end 44 of the downwardly-extending support leg 38. This results in the rear end 52 of the gravity feed shelf 32 being raised a distance D of approximately 2 inches above the back end 50 of the gondola shelf 12. The range of distance D can vary between as much as approximately 4 inches and as little as approximately ½ inch, without significantly affecting the operation of the present invention. Depending on the depth of the inclined shelf sheet 34, this results in an angle α (see FIG. 4), i.e. the angle between the existing gondola shelf 12 and the inclined shelf sheet 34, in a range of approximately 4° to 10°, and most preferably, 6°. These angles may vary depending on the type of rollers employed and the type of product to be dispensed on the gravity feed shelving.

(0036) Turning to FIGS. 5-8, the roller track members 36 are secured directly to the inclined shelf sheet 34 during manufacture of the gravity feed shelf 32 (i.e., prior to installation on a gondola shelving unit 10). A manufacturing operation is preferably employed for adapting the inclined shelf sheet 34 to have the capability of securing the roller track members 36 thereto.

(0037) The result of the manufacturing operation is shown in FIG. 5. In what is referred to herein as a "piercing and forming" operation, a plurality of pairs of front tabs 54, 56, a plurality of pairs of rear tabs 58, 60, and a plurality of pairs of intermediate tabs 62, 64 are pierced through the inclined shelf sheet 34, with each of the projecting upwardly from the inclined shelf sheet 34. As the tabs are pierced, the tabs 54, 56; 58, 60; 62, 64 of each given pair of tabs are simultaneously bent away from one another. Each pair of rear tabs 58, 60,

intermediate tabs 62, 64, and front tabs 54, 56 are oriented collinearly across the upper face of the inclined shelf sheet 34.

(0038) Additional pairs of tabs (not shown), oriented collinearly with the front tabs 54, 56, rear tabs 58, 60, and intermediate tabs 62, 64, may further be provided for yet additional stability. Such additional pairs of tabs may be particularly desirable for a gravity feed shelf 32 made in accordance with the present invention and used for a relatively deep gondola shelf 12, as the additional pairs of tabs tend to prevent the roller track members 36 from bowing or lifting off the plane of the inclined shelf sheet 34, which can happen, for example, under the weight of many heavy packages.

(0039) While the tabs of a given pair of tabs, such as front tabs 54, 56, may be horizontally aligned with one another, it is recognized that for increased stability, the tabs of any given pair of tabs are preferably staggered or off-set from one another, as shown in FIG. 5. Preferably, the tabs 54, 56, 58, 60, 62, 64 are each bent over the corresponding holes formed in the inclined shelf sheet 34 during the piercing and forming operation. It will be recognized by those of ordinary skill in the art that if the tabs 54, 56, 58, 60, 62, 64 are formed by piercing them in an opposite direction, i.e. by piercing the tabs of a given pair of tabs 54, 56 and 58, 60 away from one another as opposed to towards one another, the forming part of the operation would result in the tabs being bent in a direction opposite to the corresponding holes formed in the inclined shelf sheet. It will be recognized by those of ordinary skill that alternative shapes for the tabs 54, 56, 58, 60, 62, 64 could be utilized, for example to form a more simple straight-winged shape, or a 90°-angled hook shape (neither of which are shown).

(0040) Sometime subsequent to the piercing and forming operation, in a step referred to herein as a "track-securing" operation, each of the roller track members 36 is slid from the rear end 52 of the gravity feed shelf 32, so that the inwardly-directed feet 86 of the roller

track members 36 slide through upper wing channels 66, 68 formed by the rear tabs 58, 60, then through the intermediate wing channels 70, 72 formed by the intermediate tabs 62, 64, and finally through the lower wing channels 74, 76 formed by the tabs 54, 56, until the front edge 37 of each roller track member 36 is secured in place, forwardly of the lower wing channels 74, 76. If desired, each roller track member 36 may be pushed past the lower wing channels 74, 76 until the front edge 37 is flush against a front end stop of the inclined shelf sheet 34, discussed below.

(0041) The portion of the tabs 54, 56, 58, 60, 62, 64 extending above the inwardly-directed feet 86 secure the roller track members 36 to the inclined shelf sheet 34. It is recognized that the wing channels 66, 68, 70, 72, 74, 76 may have a different shape, depending on the shape of the tabs formed during the piercing and forming operation.

(0042) To facilitate performance of the piercing and forming operation, the piercing and forming operation may be performed prior to forming the downwardly-extending support leg 38, if present, prior to adding the stop member 40, if present, and/or prior to forming an upwardly-directed lip 92 on the inclined shelf sheet 34, discussed below. This is in view of the fact that the piercing and forming operation is most easily performed using a flat sheet. The forming of the support leg 38, the addition of the stop member 40, and the forming of the upwardly-directed lip 92 prior to the piercing and forming operation could prevent the material used to form the inclined shelf sheet 34 from lying flat during the piercing and forming operation, or could require costly modifications to fixtures and machinery employed to perform the piercing and forming operation.

(0043) As best shown in FIG. 6, each of the roller track members 36 is preferably in the form of a conventional track 78 that appears to have a substantially C-shape, turned on its open side, in cross-section. This is similar to the track used for the roller track members of the E-Z Adjust® gravity-flow shelving system available from B-O-F Corporation of Aurora,

Illinois, the assignee of the present invention. Other types of gravity feed track members may be used, provided they are equipped with downwardly depending legs and inwardly-directed feet for secured engagement within the wing channels 66, 68, 70, 72, 74, 76, similar to the side support legs 84 and inwardly-directed feet 86 of the roller track member 36. Typically, each roller 88 (removed from FIG. 6 for clarity, but one of which is exploded out of the track member 36) along the roller track member 36 is approximately 1 inch long, 1 inch in diameter, and preferably formed of High Density Polyethylene, while each C-shaped roller track member 36 is approximately 1 inch wide, 1 inch high, typically of a length, for the common gondola shelving units 10 used in retail grocery stores, in the range of approximately 22 inches to 30 inches, and formed of rolled steel sheet stock. However, it will be recognized that multiple other types and dimensions of roller tracks and rollers could be used without departing from the scope of the present invention.

(0044) The individual tracks 78 are preferably secured to the inclined shelf sheet 34 with a centerline-to-centerline separation distance ranging from approximately 3 inches to 12 inches, but other centerline-to-centerline spacings will also readily work, so long as the merchandise to be dispensed on the gravity feed shelf 32 is wider than the centerline-to-centerline distance, so as to avoid product falling into a gap between two adjacent roller track members 36. It will be recognized that because the location of the individual track members 36 is a direct result of the placement of the upper, intermediate, and lower wing channels 66, 68, 70, 72, 74, 76, the positioning of tooling utilized to perform the piercing and forming operation for making the tabs 54, 56, 58, 60, 62, 64 is necessarily adjusted by the manufacturer to effect the desired resulting centerline-to-centerline separation distance of the tracks 78.

(0045) It will be recognized that vertical walls may be provided between pairs of wings to sub-divide the gravity feed shelf 32, if desired, for dispensing smaller product so as to maintain distinct columns of merchandise on a single gravity feed shelf 32.

(0046) In the preferred version of this first embodiment, the front tabs 54, 56 are spaced approximately 2 inches rearward of the front end 51 of the gravity feed shelf 32, and the rear tabs 58, 60 are spaced approximately 2 inches forward of the rear end 52 of the gravity feed shelf 32.

(0047) The track 78 comprises an upper elongated surface 80 having a plurality of roller-receiving apertures 82 therein, a pair of side support legs 84 extending downwardly from the sides of the upper elongated surface 80, and inwardly-directed feet 86 projecting inwardly from the side support legs 84 at a lowermost end thereof. The roller-receiving apertures 82 can be formed on approximately 1 inch centerlines, for example, when 7/8 inch-diameter rollers 39 are used. The inwardly-directed feet 86 get securely retained within the upper wing channels 66, 68, within the intermediate wing channels, 70, 72, and within the lower wing channels 74, 76 by the tabs 54, 56, 58, 60, 62, 64 against the inclined shelf sheet 34, as shown in FIG. 9. The inwardly-directed feet 86 preferably extend the entire length of the track 78, but it will be recognized by those of ordinary skill in the art that the inwardly-directed feet 86 need only be present in the immediate vicinity of the tabs 54, 56, 58, 60, 62, 64 when the roller track members 36 are secured to the inclined shelf sheet 34.

(0048) Each roller 88 is rotatably retained within each of the roller-receiving apertures 82, with at least a portion of each of the rollers 88 being exposed above the upper elongated surface 80 to provide a roller bearing surface, generally denoted by reference numeral 90 (see FIG. 16), for merchandise to move toward the front of the gravity feed shelf 32 by gravity. The axle 94 of each of the rollers 88 is, for example, rotatably secured in parallel axle-receiving holes 96, 98 provided in the side support legs 84 of the track 78. An

upwardly-directed lip 92 may be formed at the front end 51 of the gravity feed shelf 32 to provide a front end stop of the gravity feed shelf 32, in order to prevent product from falling forward and off the front of the gondola shelf 12.

(0049) Turning to FIGS. 9-10, a second embodiment enables the manufacturer to dispense with tracks 78 altogether, because the rollers 188 are supported directly by the inclined shelf sheet 134. For the sake of clarity, components in this second embodiment that are similar to components described above in the first embodiment are designated with reference numbers similar to the corresponding components of the first embodiment, but increased by 100.

(0050) As in the first embodiment, the gravity feed shelf 132 of the second embodiment includes an inclined shelf sheet 134 having a downwardly-extending support leg 138 along a rear edge thereof. The downwardly-extending support leg 138 has a stop member 140 in the form of an L-shaped bracket 142, which may have the same dimensions and manner of placement on the inclined shelf sheet 134 as in the gravity feed shelf 32 of the first embodiment, so for the sake of brevity, a detailed discussion of these similar features on the gravity feed shelf 132 is omitted.

(0051) The rollers 188 of the gravity feed shelf 132 are rotatably secured directly to the inclined shelf sheet 134, rather than to a plurality of intermediate roller track members. Preferably, a three-step process is employed to mount the rollers 188 directly onto an inclined shelf sheet 134. In the first step, referred to herein as a "punching" operation, the inclined shelf sheet 134 is punched to form specific shaped portions therein. If the rollers 188 are to be able to pass through the plane of the inclined shelf sheet 134, the shaped portions preferably take the form of roller-receiving apertures 182, as shown in FIG. 9. Instead of being entirely rectangular, like the roller-receiving apertures 82 in the track 78 of the first

embodiment, these roller receiving apertures 182 punched in the inclined shelf sheet 134 are each shaped to include the outline of bodies of two opposing axle-support legs 198, 200.

(0052) If the rollers 188 are instead to be mounted such that they are disposed entirely above the plane of the inclined shelf sheet 134, then the punching operation does not need to form roller-receiving apertures 182. Instead, in a variation of the second embodiment, as shown in FIG. 11, the punching operation only forms the outline of bodies of two opposing axle support legs 198, 200.

(0053) In a second step, referred to herein as a "bending" operation, the axle support legs 198, 200 are bent or folded to a position substantially perpendicular to the plane of the inclined shelf sheet 134, as shown in FIGS. 11 and 13. As in the first embodiment, it is recognized that in order to facilitate the punching and bending operations, it is preferable to perform these operations prior to forming the downwardly-extending support leg 138, prior to adding the stop member 140, and/or prior to forming an upwardly-directed lip 192 at the front end 151 of the gravity feed shelf 132. Again, this is because it is easier to perform the punching and bending operations if the material used to form the inclined shelf sheet 134 is still generally flat. Each of the axle support legs 198, 200 includes an axle-receiving opening 202 therein. Preferably, a portion of the axle support legs 198, 200 form locking tabs 204, 206 over the axle-receiving opening 202.

(0054) In a third step, referred to herein as a "pressing" operation, subsequent to the bending operation, the rollers 188 are pressed into place by pushing the axle 196 of each roller 188 onto the axle-receiving openings 202 provided in the axle support legs 198, 200. If the locking tabs 204, 206 are provided, the axles 196 of the roller 188 are advantageously lockably retained in the axle-receiving openings 202. It is recognized that the locking tabs 204, 206 of the axle support legs 198, 200 may be shaped so as to cause an audible snap

sound for an assembler to confirm the axle 196 of the roller 188 is securely received within the axle-receiving openings 202.

(0055) Preferably, the rollers 188 used for this second embodiment are approximately 2.25 inches long, and 5/16 inch in diameter. While the number and spacing of the rollers 188 may vary depending on such factors as the size of the gravity feed shelf 132 and the type of merchandise to be dispensed on the gravity feed shelf 132, for a gravity feed shelf 132 having a width of approximately 24 inches and a depth of approximately 22 to 30 inches, to be used for dispensing multi-pack (12-, 18- or 24-can) cartons of beverage cans, it is preferable to provide at least four columns of rollers 188 on a gravity feed shelf 132, with twenty-four rollers 188 per column, and with the columns spaced approximately 2 inches apart.

(0056) Because it is recognized that merchandise may be stacked, e.g., carton upon carton, on a given gravity feed shelf 32, 132 of the present invention, but it is not desirable for the upwardly-directed lip 92, 192 to block a consumer's access to a lowermost product at the front of the gravity feed shelf, front end stop extensions 209 may be provided. Such front end stop extensions 209 may be used with any of the embodiments of the invention described above, and in a given embodiment, may take the form, for example, as shown in FIG. 14, of a plurality of generally inverted U-shaped wire members 211, each having first and second legs 213, 215 secured to wire-receiving holes 219 provided in the inclined shelf sheet 34, 134.

(0057) Advantageously, covers 221 may be provided on one or more of the inverted U-shaped wire members 211. These covers 221 may advantageously be in the form of plastic, cardboard, or paper sleeves and include printed indicia on an exposed surface thereof, so as to serve as shelf banners or so-called "shelf-talkers." That is, these covers 221 may be used to advertise products or display pricing or sale information, without substantially impeding consumers' visibility of or access to the stacked merchandise displayed on the inclined shelf. The desirability of providing, adjacent to shelved merchandise, attention-

grabbing enticements to consumers is well known in the art. Therefore, the covers 221 advantageously may include not only indicia thereon, but also battery-powered coupon-dispensing capability and/or LED flashing lights and/or sound-emitting elements.

(0058) An alternate front end stop extension is accomplished, as shown in FIG. 16, by providing a plurality of semi-rigid curved sheets 223 in elongated slots 225 formed either in the front of the inclined shelf sheet 34, 134 or in an added elongated sheet-support member 227 provided along the front of the inclined shelf sheet 134. The semi-rigid curved sheets 223 are preferably of a suitable material to withstand the force of gravity feed product sliding from the rear of the inclined shelf sheet 34, 134, and into the semi-rigid curved sheets 223. However, the semi-rigid curved sheets 223 are also preferably somewhat bendable so that a consumer may bend the sheets 221 forwardly of the upwardly-directed lip 92, 192, i.e. to remove merchandise from the gravity feed shelf 32, 132. By way of example only, the semi-rigid curved sheets 223 may be formed of a plastic material with a good shape-retaining memory. The semi-rigid curved sheets 223 may also, like covers 221, advantageously include printed indicia thereon. The primary use of the front end stop extension, regardless of its form, is to prevent stacked packages on the second (or higher) level of a given stack on a single gondola shelf 12, 14 from sliding or creeping over the lower package(s) of that given stack. A secondary use is, when the aforementioned "shelf-talkers" are employed, to advertise product or display pricing or other information to customers.

(0059) In order to reduce the obstruction to customers caused by the presence of the inverted U-shaped wire members 211, each of the inverted U-shaped wire members 211 may advantageously be independently biased or spring-mounted to the inclined shelf sheet 34, 134, i.e. to facilitate bending of the inverted U-shaped wire members 211 in a direction toward the customer under the weight of the customer pulling a package or carton forwardly, toward the inverted U-shaped wire members 211. One such method of biased mounting is

shown in FIGS. 17 and 18, wherein the springs 230 are integral loops within the inverted U-shaped wire member 211.

(0060) Such spring mounting preferably has a sufficient stiffness to resist movement of the inverted U-shaped wire members 211 under the gravity-induced, forward-prone weight of the packages alone, and even under the force of a package sliding down the gravity feed shelf from the rear of that shelf upon the removal of packages positioned closer to the front 151 of the shelf. On the other hand, however, the spring mounting is not so stiff that it impedes a person from bending them forward by pulling a package forwardly over the inverted U-shaped wire members 211 to remove the package from the shelf. That is, once a package is removed from the shelf and is no longer in contact with any of the inverted U-shaped wire members 211, the inverted U-shaped wire members which were previously pulled forward will now immediately return to their original upright position, to which they are normally biased by their independent spring mounting via springs 230, so as to prevent any packages from falling over the front of the gravity feed shelf.

(0061) As shown in FIGS. 17 and 18, the first and second legs 213, 215 of the inverted U-shaped wire members 211 include rearwardly-directed portions 232, 234 that extend along the top of the inclined shelf sheet 34 and continue integrally into the springs 230. The latter are shown to be integral spring loops that extend above the top of the inclined shelf sheet 34. The rearwardly-directed portions 232, 234 of the inverted U-shaped wire members 211 further extend through apertures 219 formed in the inclined shelf sheet 34. Terminal ends 236, 238 of the rearwardly-directed portions 232, 234 of the inverted U-shaped wire members 211 are secured, for example by spot welding or fasteners, to the underside of the inclined shelf sheet 34. It is recognized that the terminal ends 236, 238 may instead be spot welded to the top of the inclined shelf sheet 34, in which case apertures 219 need not be provided.

(0062) As illustrated in FIGS. 17 and 18, the loop of the spring 230 along each leg 213, 215 of the inverted U-shaped wire member 211 may advantageously be hidden from view, i.e. by the side support legs 84 of the roller track member 36. When positioned between the walls, or side support legs 84 of the roller track member 36, and depending on the height of the roller track member 36 and diameter of the rollers 88, it may be necessary to position the loop of the spring 230 between two roller-receiving apertures 92, so as to avoid interference with any rollers. In the event a roller 88 would be obstructed by the presence of the loop of the spring 230, it may be necessary to remove a given roller 88 from a roller-receiving aperture 92 to accommodate the loop of the spring 230, or instead to even mount the spring loop outside of the confines of a given roller track member 36.

(0063) An upwardly-directed lip 192 provided along the front of the gravity-feed shelf 32 advantageously stops cases or similar boxes on the roller bearing surface 90 as they reach the front of their travel. Higher-stacked cases, which may have a tendency due to their surface slickness to slide relative to one another, are advantageously prevented from falling off the front of the shelf by the inverted U-shaped wire members 211. Broken lines in FIG. 17 are included in the legs 213, 215 to indicate that the height of the inverted U-shaped wire members 211 is selected by the manufacturer based on the height of product intended to be stacked on the shelf. Preferably, in this manner, even the highest-stacked case or similar box on the gravity-feed shelf 32 contacts at least one of the inverted U-shaped wire members 211 at the front of the gravity-feed shelf 32. Small apertures 240 along the bottom of the upwardly-directed lip 192 allow the first and second legs 213, 215 of the inverted U-shaped wire members 211 to operationally pass through the upwardly-directed lip 192.

(0064) In FIG. 17, it can also be seen (on the left side of that drawing figure) that the roller track members 36 are arranged such that the rollers 88 are not horizontally aligned, but rather, are horizontally staggered across the side-to-side span of the shelf. In this manner, the

bottoms and the leading edges of cases of beverage cans, or of similar boxed merchandise, maintain substantially constant contact with the roller bearing surface. Advantageously, this staggering of the rollers 88 substantially reduces or eliminates the problem of cases, or similar boxes, rocking and shuddering as they travel down the inclined plane of a roller bearing gravity-feed shelf.

(0065) One manner to achieve the staggering of the rollers 88 is to employ roller track members 36 in which the first roller-receiving aperture 82 of a roller track member 36 is spaced a predetermined distance, for example 0.5 inch, from one end of the roller track member 36, while the last roller-receiving aperture 82 of the roller track member 36 is spaced a different predetermined distance, for example 0.75 inch, from the opposite end of the roller track member 36. By evenly spacing the roller-receiving apertures 82 along the length of the roller track members 36, and forming each roller track member 36 to have substantially the same spacing, horizontal staggering of the rollers 88 is achieved by alternating the orientation of the roller track members 36 along the inclined shelf sheet 34 of the gravity-feed shelf 32, so that every other roller track member 36 has the first roller-receiving aperture 82 at the front of the inclined shelf sheet 34, and the remaining roller track members have the first roller-receiving aperture 82 at the rear of the inclined shelf sheet 34. In this manner, so long as the ends of the roller track members 36 are substantially evenly aligned with one another along the inclined shelf sheet 34, the spacing of the roller-receiving apertures 82 result in a staggered array of rollers 88 (provided the diameter of the rollers 88 and spacing of the first and last roller-receiving apertures 82 are properly selected).

(0066) While the invention has been disclosed with respect to certain embodiments thereof, it is recognized that the scope is not intended to be limited thereto. For example, it is recognized that the teachings of the present invention, and in particular the various apparatus and methods involving the mounting of rollers and roller track members directly on an

inclined shelf sheet, may be applied to existing inclined shelving, or to shelves of gondola-type shelving that may be inherently and selectively simply inclined by adjusting the placement of the hooks 22, 24 along the vertical slotted rails 18, 20.